NCI Alliance for Nanotechnology in Cancer
Centers of Cancer Nanotechnology Excellence

Summary Transcript

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12:00 p.m. EDT

Moderator — Ladies and gentlemen, thank you for standing by and welcome to the NCI Nanotech conference call. At this time all participants are in a listen-only mode. As a reminder, this conference is being recorded today, October 3, 2005. I would now like to turn the conference over to our host, Mr. Travis Earles from the National Cancer Institute. Please go ahead, Sir.

T. Earles — Good afternoon. On behalf of the National Cancer Institute and the NCI Alliance for Nanotechnology in Cancer, I'd like to welcome all of you to this teleconference media briefing. My name is Travis Earles, and I'm joined by my colleagues at the NCI for the formal announcement today of the Centers of Cancer Nanotechnology Excellence awards. On the call today is Dr. Anna Barker, Deputy Director at the NCI; and Dr. Gregory Downing, Director of the NCI's Office of Technology and Industrial Relations.

Also, we are pleased to be joined by the principal investigators from the seven Centers of Cancer Nanotechnology Excellence. Representing their awardee institutions and participating in this briefing from across the United States are the following leaders in the field of cancer

nanotechnology: Dr. Rudolph Juliano of the Carolina Center of Cancer Nanotechnology Excellence at the University of North Carolina; Dr. Sadik Esener of the Center of Nanotechnology for Treatment, Understanding, and Monitoring of Cancer at the University of California; Dr. Shuming Nie of the Emory-Georgia Tech Nanotechnology Center for Personalized and Predictive Oncology; Dr. Robert Langer of the MIT-Harvard Center of Cancer Nanotechnology Excellence; Dr. Chad Mirkin of Nanomaterials for Cancer Diagnostics and Therapeutics at Northwestern University; Dr. James Heath of the Nanosystems Biology Cancer Center at the California Institute of Technology; and Dr. Samuel Wickline of the Siteman Center of Cancer Nanotechnology Excellence at Washington University.

You can find the complete list of centers and principal investigators along with the official NCI press release at the NCI Alliance for Nanotechnology in Cancer Web site at nano.cancer.gov.

And now I'd like to introduce Dr. Anna Barker, the Deputy Director for Advanced Technologies and Strategic Partnerships at the National Cancer Institute.

Dr. Barker — Thank you, Travis, and thanks everyone for joining us on-line today for this press conference and our announcement. This is, for the National Cancer Institute, a paradigm-shifting announcement in terms of what we believe nanotechnology has to offer and to bring to cancer in the next

several years. I want to thank all of you on behalf of our Director, Dr. Andrew von Eschenbach, and all the folks here at the National Cancer Institute who have worked very hard to bring this initiative to fruition.

The awards we'll make today, as you heard from Travis, will establish seven Centers of Excellence across the United States in nanotechnology. The funding for these awards will total around $26.3 million, which is a part of our overall nanotechnology alliance. The centers are, we believe, representative of the newest kind of network that is going to have the biggest impact in terms of really moving this whole agenda forward to bring the best of contemporary science to address cancer issues.

Nanotechnology is not new to the NCI. Through our Unconventional Innovation Program we have supported the development of nanotechnology for about the past 7 years. This has especially been focused on areas such as drug delivery and imaging. However, today is the beginning of what we believe will be an unprecedented network of networks that will allow us to take advantage of the enormous strength we have in our Cancer Centers and the enormous strength we have in science overall now.

These centers will bring together multidisciplinary teams of basic and clinical researchers with material scientists, as well as with chemists, engineers, and others. Hundreds of investigators will be involved in this

network at some of the leading centers across the United States, as you see from your list of awardees. These CCNEs, or Centers of Cancer Nanotechnology Excellence, that have actually won these awards, are to be congratulated.

The individuals on the call today with us will describe their programs, but I should tell you that it was a highly competitive endeavor to win one of these awards.

There were a number of applications from a lot of really excellent institutions.

I want to thank a couple of people at the NCI before I go any further who helped us to plan our nanotechnology initiative. Dr. Greg Downing, who Travis mentioned, is our Director of the Office of Technology and Industrial Relations. I also want to mention Dr. Mauro Ferrari at The Ohio State University who helped us to fashion a large amount of this nanotechnology plan. This announcement could not have happened, I think, without these individuals and Travis and many of the people on the call and around the country actually contributing to this plan.

Today's a very big day for us. Launching this initiative has taken some time and the planning has taken an enormous amount of effort on the part of many, many individuals. But it's particularly important to us today

because we believe that nanotechnology has an enormous amount of promise for changing the future of cancer for every American. As you know, we have challenged our community to really increase progress against cancer to, in the next decade, potentially eliminate the suffering and death due to this disease. And we think that nanotechnology is probably one of the most promising areas of science to come along in the last hundred years in terms of really moving this equation in the direction toward eliminating suffering and death due to cancer.

You have lots of experts on the call today, so I'm not going to talk much about nanotechnology. Many of you, I'm sure, have done research in this area, but as you know, nanotechnology--putting it in perspective--is a science that has evolved very, very rapidly over the last 10 years and even longer, driven primarily from an increased understanding of science at the molecular level. A number of things that the National Cancer Institute has supported have contributed to this, including areas such as genomics, proteomics, and bioinformatics. These are all areas that began to converge in cancer biology, and we believe set the stage. And the timing is just right for advances with nanotechnology enabling cancer biology in the future.

We have actually, as I said, over the past 7 years or longer been supporting that technology. We already have a number of new tools, some of which are already entering the clinic, in areas like drug delivery, or reducing

toxicity from chemotherapeutic agents. All of these things are moving very, very quickly. This is a science that requires multidisciplinary teams. You can't work in isolation. If you're a molecular biologist or a cancer biologist, to actually apply the tools of nanotechnology and understand the nanoscience that you are trying to actually implement, you need to work with people at the cutting edge of cancer research, materials science, chemistry, etc.

So all of these centers that you see represented today, and the individuals that you will hear from today, are actually working with a number of institutions and also companies that actually are beginning to commercialize nanotechnology platforms.

We think this series of new centers, this network that we're establishing, will actually produce an enormous amount of change across the community, not just actually in oncology, but will benefit other diseases as well because the advances we make in cancer are going to very quickly benefit other diseases. So we think this alliance where we're taking a small science, which is what we call nanotechnology, is actually going to produce an enormous amount of hope.

So for a lot of cancer patients, this new alliance is really an alliance for hope.

The alliance will be a connected alliance. People will in fact work with each other. We will exchange information and we will hopefully not reinvent the wheel.

We will share information in real time so that all of the platforms and all of the advances we have will be available to everyone in this network. We think the alliance as constituted represents some of the best of the best that we have in the United States, both in oncology and in the material sciences, in engineering, etc.

The alliance overall is composed of several pieces, individual pieces, and these centers that we are announcing today are probably the biggest piece of this. But there are other activities that will go on as part of the alliance, including some foundational platforms that we'll be announcing in a couple of weeks, a training program, and we also have a Nanotechnology Characterization Laboratory that will allow investigators to actually send us their nanoparticles, their nanodevices, for characterization. This addresses one of the issues that I'm sure will be raised on this call, and that's the safety of nanotechnology and nanotechnology's products.

And one of the things the NCI has done is to set up this laboratory for investigators, so we can actually screen their molecules, screen their devices, and screen their nanotechnology platforms for them.

A couple of last issues: All of our Centers of Cancer Nanotechnology Excellence are associated with one of our Comprehensive Cancer Centers. You may know that we have 61 comprehensive cancer centers around the United States. They are affiliated with schools of engineering and physical sciences and they are partnered, in many cases, with non-profit organizations and private-sector firms. So for cancer, they are the focus for an enormous amount of our activity and our research, and we believe associating our cancer centers with our nanotechnology centers will in fact allow us to progress very, very rapidly in oncology.

Another advantage of the Centers of Cancer Nanotechnology Excellence is being able to really move discoveries very quickly from the laboratories to clinic, and we think that nanotechnology over the next 10 years is going to produce an enormous amount of new clinical products and a lot of clinical benefits for patients.

There are several projects you'll hear about today from the investigators that are on-line, things like targeted nanoparticles for treating prostate cancer. You're going to hear a lot about imaging. This is an area that is moving very quickly, both in diagnosis and treatment, and, as you'll hear, things like next-generation magnetic nanoparticles are going to actually allow us to noninvasively image tumors in ways that we only dreamed about a few years ago.

We'll also think about ways to specifically deliver nanoparticles to certain tumors, for example, dealing in areas like bone metastasis. Areas like brain tumors that have been very, very resistant to both imaging and ultimately treatment are going to, we believe, be very enabled by some of these technologies you'll hear about today.

With the advent of these new centers, we're expecting to see a lot of new delivery systems for cancer, and we are expecting to see a lot of safer drugs that are better tolerated by cancer patients. This is an area that we believe represents near-term benefit from the alliance because by just delivering some of the drugs more specifically to cancer tumors would be an enormous advantage to patients.

I invite all of you to visit our nanotechnology Alliance Web site which is absolutely stunning. If you haven't been there, it's at nano.cancer.gov, and if you really want to keep up on what's going on in nanotechnology, this is, I think, a very exciting Web site to go to. It will also give you a good idea of all of the things that we have ongoing at the NCI in nanotechnology, and some of the things that are going on around the country in nanotechnology as well.

I'm going to ask each of our leaders that are on the call now to actually make some remarks about their specific program and their specific center. So with that I'll turn it back to Travis.

T. Earles Thank you, Dr. Barker. First I would like to introduce Dr. Rudolph Juliano of the Carolina Center of Cancer Nanotechnology Excellence at the University of North Carolina. Dr. Juliano.

Dr. Juliano Hello, this is Rudy Juliano in Chapel Hill on a beautiful Carolina blue day. So first of all, I'd like to thank the National Cancer Institute and its forward-looking leadership for giving us this wonderful opportunity to bring our strength in nanotechnology to bear on problems in cancer diagnosis and therapy.

Second, I really want to stress that our ability to put together the Carolina Center of Cancer Nanotechnology Excellence grew out of the highly collegial and interactive academic culture that exists here at the University of North Carolina. This has encouraged collaboration between the superb chemists and physicists in our college of arts and sciences, and the outstanding oncologists and basic biomedical scientists at our Weinberger Comprehensive Cancer Center, and in the academic departments of UNC Medical School. So while there are always problems in getting scientists from very different fields and disciplines to interface effectively, I really think it's much easier here at Carolina than at most other places.

Our CCNE is compromised of six projects and six cores and let me just briefly mention a few of the many important thrusts in the center. One

project, headed by Dr. Joe DeSimone of our chemistry department, will involve a generation of nanoparticles using a novel technology that adapts techniques from the electronics industry to create nanoparticles that are completely uniform in size and shape. These nanoparticles will be used to deliver both drugs and imaging agents to tumors.

Another project, an imaging one headed by Dr. Otto Zhou of our physics department, will develop sophisticated new x-ray imaging based on carbon nanofiber technology that will allow the detection of tumors at an earlier stage and with a lower dose of x-rays to patients.

A third project, headed by Dr. Mike Ramsey of chemistry, will use nanofluidics technology to create sort of lab-on-a-chip devices that will allow rapid and sophisticated bedside diagnosis of cancer and of other diseases without lengthy waits for hospital laboratory results.

Besides these three projects, there are a number of other projects and cores that involve investigators, not only from our home institution at UNC, but from collaborating institutions including our sister institution at North Carolina State University, the University of California at San Francisco, Argon National Laboratories and Duke University. We're very excited about moving ahead with the novel technologies our investigators have developed and eventually putting them to use in diagnosing and treating cancer patients. Thank you.

T. Earles Very good. Thank you, Dr. Juliano. Next is Dr. Sadik Esener of the Center of Nanotechnology for Treatment, Understanding, and Monitoring of Cancer at the University of California. Dr. Esener.

Dr. Esener Good afternoon. I would like to transmit from Southern California the appreciations of the entire team of the Center for NANO-TUMOR. First to the National Cancer Institute Alliance for Nanotechnology in Cancer, for the timely formation of these centers, and also to the reviewers of the proposals for the constructive criticism and valuable comments they have provided us.

Our highly multidisciplined team is composed of participants from the University of California at San Diego, Santa Barbara, Irvine and Riverside campuses together with the Burnham Institute. Really in Southern California, not only we break the boundaries across the departments but we also break boundaries across campuses. We all work together.

As the name of our center indicates, our main objective at the center is to apply nanotechnology to the treatment, understanding, and monitoring of cancer towards reducing the suffering and death it results in. To realize this objective, we use targeted nanoparticles of various sizes and properties, optimized for detection, sensing, imaging, and therapy. Experiments that we have performed in our laboratories and also at other

institutions already prove the feasibility of performing some of these functions with nanoparticles. Our focus at the center will be on making these nanoparticles stealth in the vascular system, specific as they attach only to the tumor, and capable of penetrating into it without polluting other organs.

We will carry on longitudinal measurements in time on cancerous cells in order to improve our understanding of the evolution of the disease, with transition to platforms rapidly to the industry, and of course the CCNEs as they become available.

Our longer-term vision is to ultimately deliver these nanoplatforms as a payload of multifunctional, smart motherships, capable of detection, identification, imaging and performing measurements, and providing treatment, as well as delivering therapies to residual cancer cells as they circulate in the system. These motherships will be somewhat larger in size than a micron, a few microns perhaps, but they will have nanoparticles as their payloads. To this end we have roped together a multidisciplinary team that not only includes distinguished physicians, scientists, mathematicians and engineers, but also seasoned entrepreneurs, and established some collaboration with the industry to incrementally move in a timely manner our discoveries to the marketplace to eliminate suffering and death due to cancer. Thanks.

T. Earles Very good. Thank you, Dr. Esener. Now joining from the Emory-Georgia Tech Nanotechnology Center for Personalized and Predictive Oncology is Dr. Shuming Nie. Dr. Nie.

Dr. Nie Yes, this is Shuming Nie from Atlanta, Georgia. At our Cancer Nanotechnology Center we'll focus on personalized and predictive oncology. It primarily consists of investigators from Emory University as well as Georgia Tech, in the same city. The overall scientific program is to develop bioconjugate nanoparticles and biomarkers for cancer molecular imaging, molecular profiling and personalized therapy. Our technology includes semiconductor quantum dots, molecular beacons, surface-enhanced Raman probes, as well as self-assembled and biodegradable nanoparticle drugs.

The overall center is organized into six projects and five cores. There are two projects that will focus on molecular imaging. Another two projects will focus on molecular profiling. One project is going to focus on targeted nanotherapeutics, and the last project is focused on bone metastasis and basic cancer biology.

And the five cores, we have two super cores. The first super core is going to be on nanomaterials, synthesis and fabrication. And another super-core is biocomputing and also bioinformatics. I should mention that a cornerstone of our CCNE is the joint Georgia Tech/Emory Department of

Biomedical Engineering which is an academically-integrated unit that was established in 1997 by Emory University and Georgia Tech. The center is also supported by strategic alliances with two NCI Specialized Programs of Research Excellence, also called SPOREs; one in breast cancer at Vanderbilt University, the other is in prostate cancer at the University of Washington.

Our center is embedded in the Winship Cancer Institute here on the Emory campus. It's also supported by two other NCI Comprehensive Cancer Centers; one at the Johns Hopkins University, the other at the Fred Hutchinson Cancer Research Center. Our center is also in partnerships with non-profit organizations such as The American Cancer Society and the Centers for Disease Control, that's the CDC. Both of these non-profit organizations are located actually on the Emory University campus, and we are also forming partnerships with outside companies including Applied Biosystems, Beckman Coulter, and Nanoplex Technologies in California. In biocomputing, we are supported by Hewlett-Packard Corporation and also Microsoft Research. This CCNE also has a very strong training component for both engineers and oncologists. We believe that they will carry out a lot of work in the future. Thank you.

T. Earles Thank you, Dr. Nie. On the call from MIT-Harvard Center of Cancer Nanotechnology Excellence is Dr. Robert Langer. Dr. Langer.

Dr. Langer Yes, thank you very much. We have a very interdisciplinary group of both biologists, chemical engineers, material scientists and engineers, people in chemistry, and people in medicine, from both the MIT and also Harvard Medical School and its associated hospitals.

We have five major lead projects. In fact, some of those were mentioned earlier when Anna was giving an overview. One of them is new ways of targeting nanoparticles, creating new nanoparticles and targeting them, using some very specific targeting systems called aptamers. We're going to be working on trying to develop new treatments for prostate cancer.

The second area is, there are some new potential drugs which have to do with siRNA. These are new types of RNA that may be able to very specifically interfere with the genetic machinery of the cancer cells. The biggest problem with getting them to be drugs is delivery, and we have some ideas that we are going to explore on doing that. There are also several approaches to create new imaging agents. One of them is to develop new magnetic nanoparticles that could allow ways to image tumors that were smaller or very hard to image previously.

I should add to that, that in the fourth one, some of the new imaging agents that we are looking at sometimes have stability problems. Sometimes you might want to deliver more than one imaging agent, and so we've actually developed, and propose to develop in conjunction with

this, new types of what I'll call MEMS devices, micro-electro-mechanical systems, sort of like lab-on-a-chip systems, that can be containers and delivery systems for these new imaging agents.

And finally, we're going to be developing new quantum dot imaging agents. These are very exciting new areas of imaging agents, but so far they've been largely toxic *in vivo* and we propose to create new ways to make them non-toxic. We also expect to interact with other cancer centers, industry, hospitals and finally, even local high schools. Thank you.

T. Earles Very good. Thank you, Dr. Langer. Next is Dr. Chad Mirkin of Nanomaterials for Cancer Diagnostics and Therapeutics at Northwestern University. Dr. Mirkin.

Dr. Mirkin Thanks. We're obviously very excited about having this and I want to thank the NCI as well. I believe this is a very important initiative, and one that could dramatically change the way we approach the study and treatment of cancer in the years to come.

Our center is also highly interdisciplinary. It brings together 38 different investigators from 15 different departments. Northwestern turns out to be one of the few places that has phenomenal strengths in cancer research at

their Robert H. Lurie Comprehensive Cancer Center and also our nanotech research at our International Institute for Nanotechnology.

The Robert H. Lurie Comprehensive Cancer Center is an NCI-designated comprehensive university-based matrix cancer center conducting a broad range of multidisciplinary basic clinical population science research, with now over $116 million in annual extramural funding, so this is a big effort. And you combine that with our nanotech institute, our International Institute for Nanotechnology, which now has over $275 million dollars of infrastructure in nanotechnology. It's one of the biggest efforts in the country that focuses on nanotechnology, and when you merge those two, it really creates a fantastic opportunity.

And that's what the center is going to do. It's really going to bring those two groups of people together to focus on developing nanotechnology, which we believe will become one of the fundamental drivers in oncology and cancer research, and obviously we are extremely excited about focusing our efforts in that direction.

Our CCNE has six themes, all merging unique capabilities provided by nanotechnology to address fundamental or technological problems in cancer research and treatment. I'm not going to go through all the specifics of them but let me summarize a few of them.

One of the projects focuses on developing nanoparticle-based assays to create the first screening tool for ovarian cancer, which is the fourth leading cause of death in females. It's amazing technology doesn't exist to do that today. One of the reasons for that is that we don't have tools that have adequate sensitivity to look at the markers that are relevant. And through nanotechnology, we've developed some of those capabilities and we're going to begin to move in that direction to see if we can accomplish that very important goal.

Another project focuses on developing nanotechnology tools for understanding what makes a cancer cell different from a healthy cell in the context of a metastatic event, and then to use that understanding to develop a new class of drugs that inhibit cancer cells from spreading throughout the body. It's a very fundamental type of project in that case but one that's key to all types of cancers, or many types of cancers at least.

A third project is one that focuses on developing very powerful imaging tools using new advances in nanoparticle chemistry. These tools promise to be about ten to a hundred times more sensitive than the currently available imaging agents, which could dramatically change the way we diagnose and follow the disease and ultimately treat the disease.

Then we have a series of projects that focus on developing therapeutic agents, nanoscale cargo bins that can target cancer cells, bind to them, and

unload chemotherapeutic agents directly to the source. And these promise to lead to more effective and less toxic forms of chemotherapy.

We're going to focus the therapeutics on two main areas, primarily prostate cancer and breast cancer. And we have a whole series of efforts that are going to utilize some of these advances in nanotechnology to make serious headway there. The exciting thing about this is that this new effort will build a bridge between scientists, engineers, and clinicians, all focused on advancing the application of nanotechnology for the diagnosis, early detection, and treatment of human cancer. We're very confident that this effort will lead to new discoveries that will enhance the care of patients and lead to approaches that prolong life.

In closing, in addition to Northwestern, we have some academic collaborations outside of the university, including University of Chicago, University of Illinois Urbana-Champagne and Yonsei University in South Korea, and we have partnerships with 18 different companies. We have a very good track record of taking nanotechnology advances made at Northwestern and transitioning them into startup companies that have been able to produce important products in some of the early product developments within the general field of nanotechnology.

T. Earles Very good. Thank you, Dr. Mirkin. The next is Dr. James Heath of the Nanosystems Biology Cancer Center at the California Institute of Technology. Dr. Heath.

Dr. Heath Thank you, Travis. I want to echo everybody else's comments in thanking the NCI for pushing this initiative forward. I am a strong believer that we have an opportunity to really change the face of cancer by bringing together nanotechnologies that are being developed and driven by problems in cancer biology. We are delighted to have this opportunity to work with the NCI and the other cancer centers to do this.

I represent three different institutions and we've all been working together for some time on these problems. I'm from the California Institute of Technology. The Co-Director of the Institute, Leroy Hood, is at the Institute of Systems Biology in Seattle; and Michael Phelps in the Department of Molecular and Medical Pharmacology at UCLA, and we're strongly coupled with the Jonsson Cancer Center at UCLA.

We have a number of projects that we're working on like the other centers, roughly six projects, I believe. One of our major focuses is to develop both the knowledge base and the technologies for executing what we call an informative diagnostic diagnosis of cancer through a blood serum. And so with our collaboratives at the Institute for Systems Biology, we have developed a method that helps us identify organ-specific secreted proteins

that reflect the health status of organs that can be monitored by interrogating blood. And we are going to be applying this technology, which we've also begun to commercialize some of that towards prostate, ovarian cancer, glioblastoma and melanoma.

Another project involves the *in vivo* imaging. We are taking a slightly different approach than the other centers in that we are not using nanoparticles for *in vivo* imaging, but instead we're using extremely high-affinity molecular agents to go in and image the metabolism of the disease using positron emission tomography. We've, for example, demonstrated that we can develop from concept to an *in vivo* image in the mouse model, a high-affinity agent in the turnaround time of about six weeks, which is a remarkably fast process. Then using nanotech tools we actually synthesize these probes on chips. And because they're radio-labeled probes, the goal was to try to synthesize them rapidly and on a daily basis, and with the chips that we've made, we have been able to execute chemical synthesis of a number of these imaging probes for imaging the metabolism of cancer in periods of like five minutes, which compares to on the order of 40 minutes to an hour for typical technologies.

So we look forward to sharing the technologies that are developed by the other cancer centers and by making our technologies available to the broader cancer community as we move forward. Thank you.

T. Earles Thank you, Dr. Heath. Representing the seventh Center of Cancer Nanotechnology Excellence is Dr. Samuel Wickline of The Siteman Center of Cancer Nanotechnology Excellence at the Washington University of St. Louis. Dr. Wickline.

Dr. Wickline Yes, it's a pleasure to be on this conference call. I also would like to thank the NCI and the others among the groups who received these awards and look forward to working together with everyone. I'll make a couple of comments about the overall program and the importance of it to science and reiterate what we heard before a bit, but I think it's always difficult when you're doing science to develop large multidisciplinary teams, particularly in academia, and maintain the continuity that's required to solve large problems like cancer. And this new CCNE effort is an attempt to get those teams established and to provide the infrastructure that will support them in academia, and I think that is a very forward-looking program and one that will go a long way towards helping solve these problems in the future.

I think also this program supports the focused efforts that we're all undertaking to solve cancer problems, but extends out into commercial partnerships as well. I think this is extremely important in order for us to consider upfront some of the needs to actually get this material translated into clinical trials, and this program has not shied away from being involved with commercialization and commercial entities.

And finally, I think the opportunity to share information with the other groups is an extremely important component of this program, through meetings and other sorts of activities that we'll have where we can all learn from each other. I think that's been a valuable aspect of the Unconventional Innovation Program.

To briefly describe what we're doing at The Siteman Center for Cancer Nanotechnology Excellence, the platform that we're using is an emulsion-based nanoparticle with multiple targeting and multiple drug delivering capabilities. One of the featured targets is tumor angiogenesis, which is common to many solid tumors, and so therefore it would be a platform that would work against, potentially, a number of tumor types. The projects involve an array of imaging, therapeutics, and informatics approaches. And specifically in imaging, we intend to use the platform to develop new tools for magnetic resonance imaging, ultrasound and CT that will diagnose tumors less than a millimeter in diameter or so, which is a very early tumor. Now we are also developing *in vivo* cell-based imaging techniques using ultrasound and extraordinary sensing capabilities that will have nanometer resolution in living cells.

The therapeutics aspect, again, to reiterate Anna Barker, we want to develop tools that will enable us to deliver potent but relatively toxic drugs in a safer way. And in addition, using ultrasound energies to activate

those to enhance drug delivery by ten to 100 times what you could get simply by targeting them. And finally the informatics approaches that we will be developing to classify nanoparticles to enhance future drug design.

Lastly, our collaborators will entail a number of corporations, including large imaging companies like Phillips Medical Systems and other medical companies like Bristol-Myers Squibb, small biotech companies, and finally other academic collaborators like University of Illinois at Urbana-Champagne. Thank you.

T. Earles Thank you, Dr. Wickline. Now I'll turn the call over to Dr. Barker to introduce the question and answer portion of our teleconference.

Dr. Barker Just to summarize very briefly, you've just heard an overview of what is an astounding group of centers that will come together as a network of networks. It's a dream that we've had at the NCI for some time in terms of leveraging our 30-plus years of investment in molecular biology, molecular genetics, and nanotechnology. It is really the convergence of so many areas of advanced technology with material science and engineering and the science of oncology itself. We believe that it is extremely forward-looking, and we believe that this network of networks will in fact allow us, across the entire construct of science, to really change the way science is done in the future and really create the multidisciplinary teams we need.

These centers are actually the heart of the alliance. I think they will be the force that actually brings all of these technologies together to answer some very vital questions about cancer and to ultimately deliver new products. You heard everything from our investigators on this call; multiplexing technologies, the idea of a lab-on-a-chip, smart nanoparticles, molecular imaging, and how we can actually take that into the next generation and how we can target cancer in new ways.

So it truly is a great pleasure for us at the NCI to see this come together, and I think it is an absolutely unparalleled group of people in a network that I think will change cancer forever, and allow us to really, in ten years, really accelerate progress against this disease.

I want to say that we will be making some additional awards beyond the alliance today. There are 12 major R01 grants that will be announced in the next couple of weeks that will speak to creating new nanotechnology platforms and partnerships, that will again inform this alliance and hopefully move the whole area of nanotechnology forward in terms of new platforms.

That will conclude our briefing from the investigators and our group here at the NCI, but we've just barely been able to touch the surface for the kinds of new technologies and new products that we think are going to be

coming out of this entire field over the next few years. We think, as Sam Wickline mentioned, that this alliance will also really enable a new generation of the private sector in terms of new companies in bringing these products to market. We believe that nanotechnology is going to enable an enormous amount of commerce in terms of new companies coming forward, and each of these centers actually has one or more alliance partners that are actually in the private sector to ensure these new findings and these new discoveries get delivered to patients in the most efficient way.

Again, we really welcome your interest in nanotechnology, especially nano-oncology, which is what this particular alliance is about. We invite you to look at our press release on today's announcement. The fact sheets and the biographies of all the principal investigators at the centers are up on the nanotechnology Web site at nano.cancer.gov. If you have additional questions after our call today and you want to arrange interviews, you can call the NCI at 301-496-6641. Now I will open it up for questions.

Moderator Thank you. Our first question comes from the line of Andrew Hawkins from the Research Policy Alert. Please go ahead, sir.

A. Hawkins Hello. Dr. Barker, I was wondering, of the $144 million that is being contributed to this alliance in nanotechnology, is the funding for the

centers, is that the largest investment that NCI has made to date? And also is that the largest investment that NCI has also made in nanotechnology, period?

Dr. Barker Yes. That was an easy question.

A. Hawkins I like those short answers.

Moderator It appears there are no further questions at this time. Mr. Earles, please continue.

T. Earles Very good. I'd just like to thank everyone for joining us. And just a reminder again, the press release, FAQs, fact sheets, bios and the awardee Web site links are all available on nano.cancer.gov. We will now close out this teleconference. Thank you very much.

Dr. Barker Thanks, everybody, for joining us today.

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